SOS Release 4.0.1 New Features Documentation

The goal of this release is to increase capabilities for interactivity with Science On a Sphere®. The new features in this release are especially useful for live presentations given by docents to an audience. The new features provide options for more dynamic presentations and more visual cues, as well as methods for demonstrating relationships between datasets.

This document describes in detail the three major new features for Science On a Sphere®:

- Annotation (Page 1)
- Zooming and the magnifying glass (Page 4)
- Layers (Page 7)

Annotation

SOS Version 4 allows pointing and drawing onto the sphere to dynamically highlight areas of interest during a presentation. In addition, icons related to datasets can be dropped onto the sphere. Annotation provides extra visual cues for the audience, and can serve as a helpful storytelling mechanism.

Annotation is controlled from SOS Remote. A new Annotation button has been added at the top of the Presentation tab. A white cursor appears on the sphere when this Annotation button is selected. (An alternative to pressing the Annotation button is to do a two-finger double tap on the trackpad from the Presentation tab.) The user then uses gestures to point, draw, and drop icons.

Point mode

Drag one finger over the trackpad (the pad should be displaying a white cursor) to move the cursor on the sphere.

Draw mode

First position the white cursor on the sphere. Then, double tap the trackpad (or tap the Draw button) with one finger to get into Draw Mode. A yellow marker will appear on the trackpad and on the sphere. Drag one finger over the trackpad to draw onto the sphere. To draw at another location, you must first get back into Point Mode (by double tapping the trackpad or by tapping the Point button), position the white cursor, and then get back into Draw Mode to draw.

You can select line color and line width by tapping the Lines button to open the Lines dialog.

All drawing can be cleared by tapping the Clear button or by doing a two-finger single tap on the trackpad. Note that drawings can be cleared while in Point Mode or Draw Mode.

Drop icons

Open the Icons dialog by tapping the Icons button. Select an icon from the library. Close the Icons dialog. Position your cursor on the sphere where you would like to drop the icon. Now, tap and hold on the trackpad to drop an icon onto the sphere. Alternatively, you can tap the "+" button to drop an icon. Use the "-" button to remove the last added icon. Use the "x" button to clear all icons on the sphere or use a three-finger single tap to clear all icons.

The size of the icon can be adjusted by using the slider in the Icons dialog.

Note that icons can be dropped and cleared while in Point Mode or Draw Mode.

Using an icon as a pointer

Open the Icons dialog. Select an icon. Then tap the Use Icon button. Close the Icons dialog. The selected icon will now be the cursor that is drawn on the sphere. Similar to a rubber stamp concept, you can drop copies of this icon onto the sphere in the same way detailed in the Drop Icons section above.
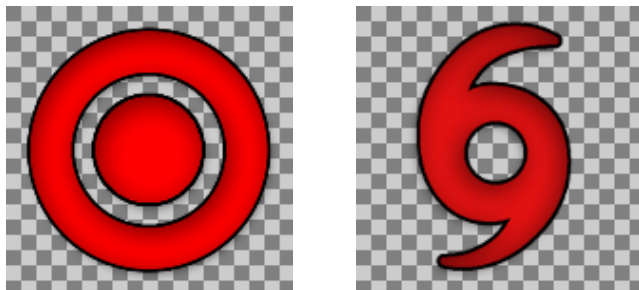
Creating and using your own icons

If you would like to create your own icons, we recommend:

Image Size: Square dimensions, minimum of 256x256 pixels
Format: Transparent PNG
Other: Some blank space around icon
Example Icons:

You can add an icon to your clip's playlist file so that it shows up in the Icons dialog when you select the clip for playing. To do this, simply add an **icons = value** keyword/value pair

to the clip's playlist file and place the icon in the clip's directory. Note that you can specify more than one icon by making a comma separated list with **no** spaces.

For example, if you create a satellite icon and a rocket icon and want to add those icons to your Blue Marble dataset, your Blue Marble playlist.sos file might look like this:
name = Blue Marble (23 degree tilt)
data = 4096.jpg
category = land
icons = satellite.png,rocket.png

In this case, the icon files should be placed in the same directory as where the playlist.sos file is located. In other words, use relative paths when specifying the icons in the playlist file.

Once you load the dataset on SOS and then open the Icons dialog, the two icons you added will appear at the top of the list of available icons.

Another way to specify an icon is via the playlist sos file located in the sosrc directory. You specify the **icons = value** keyword/value pair for a clip here as well, however, the pathname of the icon file must be specified relative to the location of the clip's playlist.sos file. For example, if you have an icon called turtle.png located in your site-custom folder, and you would like to make this icon available with the Loggerhead Sea Turtle dataset, you can add that to your sos playlist as follows:

.
.

# Blue Marble Dataset
include = /shared/sos/media/land/blue_marble/blue_marble/playlist.sos

# Loggerhead Sea Turtle Tracks
include = /shared/sos/media/oceans/LoggerheadSeaTurtleTracks/playlist.sos
icons = ../../site-custom/turtle.png

.
.

Finally, if you have a general set of icons that you create and that your site may use often, you can add these icons to the default icon library so that they are automatically available with every dataset. To do this, simply add your icons to the directory **/shared/sos/etc/AnnotationIcons/.**

Other

The Reset button moves the Point or Draw cursor back to the last set User Position (as set on the Presentation page). This is useful in case you lose site of the cursor.

Tap the "i" information button to view a quick help guide for Annotation gestures.

When a new clip is selected from the playlist, all drawings and icons are automatically cleared and the Presentation tab is reset to display the Presentation page.

Annotation additions to the SOS automation protocol

Three new annotation keywords have been added to the SOS automation protocol. The drawing aspect of annotation can be controlled via these new commands. Here is a synopsis of the functionality:

Usage:
    annotation help
    annotation clear
    annotation drawline [lat1,lon1,lat2,lon2,line_size,red,green,blue]
where
    lat1,lon1 is the start point of line in degrees
    lat2,lon2 is the end point of line in degrees
    line_size is the width of line (the default size is 6.0)
    red,green,blue: rgb color of line (values range from 0.0 to 1.0)

Limitations of annotation

The initial implementation of annotation has a few limitations that we anticipate improving in later releases.

Creating new clips with annotation icons is not yet supported in the playlist editor. This must be entered manually into the appropriate file as detailed above.

Zooming and the magnifying glass

SOS Version 4 allows zooming in over a region of the sphere for a closer look at the data. The zooming is done via a virtual magnifying glass that appears on the sphere.

The zoom level and magnifying glass location are controlled from SOS Remote. A new Zoom button has been added at the top of the Presentation tab. The magnifying glass appears on the sphere when this Zoom button is selected. (An alternative to pressing the Zoom button is to do a one-finger double tap on the trackpad from the Presentation tab.) The user then

uses gestures to move the magnifying glass and to zoom in and out. A slider allows changing the size of the magnifying glass.

Other

While on the Zoom page, you can toggle the magnifying glass on or off by selecting the Show or Hide buttons, respectively.

The Reset button moves the magnifying glass back to the last set User Position (as set on the Presentation page).
Tap the "i" information button to view a quick help guide for Zoom gestures.

When a new clip is selected from the playlist, the magnifying glass is automatically cleared and the Presentation tab is reset to display the Presentation page.

Zooming additions to the SOS automation protocol

A new zoom keyword has been added to the SOS automation protocol. All aspects of zooming and the magnifying glass can be controlled via this new command by using a number of subcommands after the zoom keyword. Here's a synopsis of the functionality, as given by the automation command **zoom help**:

Usage:
   zoom help
   zoom info
   zoom subcommands
where
   subcommands is a list of one or more of the following:
   on
   off
   factor [float]
   winsize [float]
   latlon [float,float]

zoom help prints the above synopsis of the zoom command syntax.

zoom info prints a status line with the current zoom state. This status line is 4 blank-separated fields: A keyword on or off, the current zoom factor, the diameter of the zoom window in nominal degrees of latitude, and the center latitude,longitude in degrees. Here's a typical example:
      off +2 40 0,0
In this example, the magnifying glass is currently turned off, but if it is turned on, it will zoom by a linear factor of two, with a magnifying glass that is 40 degrees in size, centered over latitude 0 and longitude 0.

zoom on turns on zooming, making the magnifying glass visible.

zoom off turns off zooming, hiding the magnifying glass.

zoom factor n sets the linear zoom factor to n, where n is specified as a floating point number from 1.0 to a system-dependent maximum value (currently 1,000,000). A zoom factor of 1.0 displays the zoom window at the same size as everything else on the sphere. A zoom factor of n makes the contents of the magnifying glass window appear n times larger in each linear dimension.

zoom winsize n sets the diameter of the magnifying glass to n degrees of latitude. If the magnifying glass is centered at the equator, this will also be the same size in degrees of longitude. For example, a value of 40 if centered at 0 latitude and 0 longitude would make the magnifying glass extend from -20 degrees south to +20 north, and -20 west to +20 east. As the magnifying glass is moved from the equator, it retains it's shape, so the number of degrees of longitude subtended will differ from the (constant) number of degrees of latitude.

zoom latlon m,n sets the center location of the magnifying glass to m degrees north latitude and n degrees east longitude.

Multiple attributes of the zoom window may be specified in one line. For example:
        zoom on +5 40 39.5,-105
will turn on the magnifying glass, set it to a zoom factor of 5.0, set the magnifying glass diameter to 40 degrees of latitude, and center the magnifying glass at 39.5 degrees north latitude and 105 degrees west longitude, all in one command.

Limitations of zoom

Note that the initial implementation of zooming in SOS is considerably more restrictive than Google Earth and similar systems. In SOS, we load all imagery, including zoomed-in views, at the time the clip is loaded. Memory restrictions will preclude zooming in very deeply over a wide geographic area. One can zoom in a few steps over a wide area, or zoom in deeply over a restricted geographic area, but not both simultaneously. We expect to add a more flexible tiling capability in a future version of SOS, which will implement dynamic management of zoomed imagery and associated memory. This will allow for more flexible zooming, provided the data set is available at sufficiently high resolution.

Layers

SOS Version 4 introduces multiple geographic layers in a single SOS clip. Each layer's visual attributes can be manipulated via the SOS Remote app. A multi-layer display can be created either statically in the clip definition, or interactively using SOS Remote.

By using the new Layers tab in SOS Remote, the user can toggle individual layers on and off, adjust the level of transparency of each layer, or delete a layer. Any labels or PIPs associated with a clip are now automatically placed in dedicated layers named Labels and PIPs. These can be interactively manipulated like any other layer.

Ad hoc (interactive) layering

Any two (or more) clips can be combined interactively in SOS Remote. The first clip is loaded normally, by tapping it's button in the playlist displayed by the Presentation tab. A second clip can be loaded over the first by pressing and holding the button of another clip. Additional clips can be loaded over previous ones in the same way. Unless the new clip has a transparent background, it will appear to completely replace the previous clip. In this case, the interactive layering controls will need to be used to view other layers, or visually combine the layers.

When adding a new layer interactively, only the primary data file of the added clip is used. Any labels or PIPs within that clip are ignored. Any labels and PIPs defined within the initial clip remain loaded as additional layers are added. Visibility of the first layer's labels and PIPs can be interactively manipulated as layers via SOS Remote in the same way that the global data layers can be.

Predefined (playlist definition) layering

A multi-layer clip may be defined as part of a playlist by using the new **layer = name** keyword/value pair. Each use of a **layer = name** keyword/value pair within a clip definition defines a new layer and specifies the name of the layer. The specified name of the layer is used to identify it in the layer table in SOS Remote's Layers tab. Each new layer specified appears visually on top of any previous layers.

The **layerdata = value** keyword/value pair is repeated for each layer to specify the corresponding data file for the layer. A layer defined this way may have a **layervisible = no** keyword/value pair defined to specify that the layer is not initially visible. A layer may also have a **layeralpha = value** keyword/value pair to further specify the initial opacity of the layer. An alpha value of 0.0 means that the layer is totally transparent, and 1.0 means the layer is totally opaque. A slider in the SOS Remote interface is available to interactively manipulate the opacity of each layer.

Note: For compatibility with versions of SOS prior to SOS Version 4, a default layer is created when the "data = " playlist keyword is seen in a playlist before the "layer = "

keyword. The name of this default layer will be the same as the name of the clip, given by the "name = " keyword.

Layering additions to the SOS automation protocol

A new layer keyword has been added to the SOS automation protocol. All attributes of a layer can be modified via this new command, by using a number of subcommands after the layer keyword. Here's a synopsis of the functionality, as given by the automation command **layer help**:

Usage:
   layer help
   layer info
   layer index name: Name for this layer (up to end of the line)
   layer index subcommands
where
   index is keyword top, pip or label, or an integer layer index (zero-based)
   subcommands is a list of one or more of the following:
   on
   off
   alpha [0.0-1.0]
   minzoom [float]
   maxzoom [float]
   east [float]
   west [float]
   north [float]
   south [float]
   delete

layer help prints the above synopsis of the layer command syntax.

layer info prints information about the currently loaded layers. One line is printed for each layer in the following format:

index type onoff alpha label minzoom maxzoom east west north south

where:
   index is the zero-based integer index number of the layer.
   type is a keyword identifying the contents of the layer. It is one of the literal keywords GeoData, PIPs, or Labels.
   onoff is one of the literal keywords on or off.
   alpha is the opacity of the layer, a floating point number from 0.0 to 1.0.
   label is a quoted string that is the name for the layer

[Note: the following layer attributes are only useful for geographic data layers. PIPs and Labels are not visible in the magnifying glass, and the geography of their layers is not modifiable.]

minzoom is the minimum zoom range where the layer will be visible in the magnifying glass.
maxzoom is the maximum zoom range where the layer will be visible in the magnifying glass.
east, west, north, south specify the geographic extent of the layer. east and west specify the east and west edges of the layer's data, in degrees east longitude. north and south specify the north and west edges of the layers' data, in degrees north latitude.

The attributes of a layer can be changed by specifying the layer index immediately after the **layer** automation keyword. The index can be an integer. The layers are numbered from bottom to top, starting at zero. The number zero always specifies the bottom layer. The literal keyword **top** can be used to specify the top geographic data layer. The literal keywords **pip** and **label** can be used to specify the associated non-geographic layer.

layer index name New name for the layer specifies the name for the layer. Here, the new name for the layer is given by the rest of the text on the line after layer index name. The new name may contain white space.

layer index on makes the layer visible.

layer index off makes the layer invisible.
layer index alpha [value] specifies the opacity (alpha) of the layer. The opacity is specified by a floating point value from 0.0 to 1.0.

[Note: the following layer attributes are only useful for geographic data layers. PIPs and Labels are not visible in the magnifying glass, and the geography of their layers is not modifiable.]

layer index minzoom [float_value] specifies the minimum zoom factor for the layer. The layer will not appear in the zoom magnifying glass when the zoom factor is less than this number.

layer index maxzoom [float_value] specifies the maximum zoom factor the layer. The layer will not appear in the zoom magnifying glass when the zoom factor is greater than this number.

layer index east float
layer index west float
layer index north float
layer index south float

These commands specify the geographic extent of the data within the layer. They specify the east and west edges of the data in degrees east longitude, and the north and south edges in degrees north latitude. The data file associated with the layer is stretched to linearly cover the specified area. This is similar to the way that a PIP would behave. Unlike a PIP, the associated data region can be magnified with the zoom magnifying glass.

With the exception of name, multiple layer attributes can be specified in one command. For example:

      layer index on alpha 0.5 east -90 west -105 south 30 north 45

makes the layer associated with index visible at half opacity and specifies all four edges of the corresponding data in one command.

The default attributes of a layer are: visible at full opacity, using a system generated name, visible at all zoom levels, and covering the entire sphere from -180 west to +180 east and from -90 south to +90 north.

overlay filename A new layer is loaded by the automation command **overlay filename**, where filename here is replaced by the path of the data file to be loaded to the new layer.

Layering additions to the SOS playlist format

The following new keyword/value pairs have been added to the SOS version 4.0.1 playlist format:

The layer keyword creates a new layer and gives it a name. The name may contain spaces and continues to the end of the line.

layer = name

The layerdata keyword specifies the data file that will be loaded into the new layer.

layerdata = filename

The following keywords set the initial values for the layer attributes described above in the discussion of layering additions to the SOS automation protocol.

layeralpha = value
layervisible = boolean
layereast = value
layerwest = value
layernorth = value
layersouth = value
layerminzoom = value
layermaxzoom = value

Layering additions to the SOS media library

We recently added a set of "feature name" overlays to most of our astronomical bodies in our Data Catalog. These were developed here at NOAA by Steve Albers, and are available on our ftp server now. The features were integrated into our existing data sets but are not turned on by default. You'll need to go to the layers tab of the iOS SOS Remote app to experiment with them.

For sites that use our cron jobs to synchronize with our ftp server, these layers should haved appeared on your SOS computer. You can also use the SOS Stream GUI menu item **Library->astronomy** to load all the astronomy clips, then **File->Update Playlist Data...** to get the latest version of layers while running SOS as the sos user.

In addition, we have created a new library called **overlays** which is located in the **/shared/sos/media/** directory, and which will show up as a library category on SOS Stream GUI and on the iPhone/iPad. This library will contain useful earth-related transparent layers (specified as datasets in a standard clip playlist.sos file format) that can be used for both pre-programmed as well as interactive layering. An example of a layer that will be in this category is an outline of Country Borders. We are in the process of adding datasets to this library, so if you have any suggestions or if you create any layers that may be useful to others in the SOS community, please send them our way.

Limitations of layering

The initial implementation of layers has a few limitations that we anticipate improving in later releases.

- Creating new clips with multiple layers is not yet supported in the playlist editor. Layering specifications must be entered manually into the appropriate files.
- Multiple layers can be resource intensive. Some multi-layer clips may not play well, if at all. Some trial and error may be required to verify that a layered clip plays well on a particular SOS installation.
- Loading new layers pauses animation briefly during the load.